phorus, 0·56; manganese, 0·77; and iron (by difference), 94·76.

The memoirs submitted by the Carnegie research scholars were taken as read, and are open to discussion by correspondence. The paper by Mr. A. Campion, for which the gold medal was awarded, covers seventy-five pages, and is illustrated by fifteen plates. It deals with the heat treatment of steel under conditions of steelworks' practice. The paper by Dr. O. Boudouard, of Paris, for which a special silver medal was awarded, covers eighty pages, and deals with the determination of the points of allotropic change of iron and its alloys by the measurement of the variations in the electric resistance. Results are given for carbon steels, chrome steels, tungsten steels, manganese steels, and nickel steels. The remaining memoirs presented by the Carnegie research scholars deal with the influence of varying casting temperature on the properties of alloys, by Mr. P. Longmuir, of Sheffield, and with the manufacture of tool steel, by Mr. E. Schott, of Berlin.

The proceedings concluded with the usual votes of thanks to the Institution of Civil Engineers, proposed by the president and seconded by Prof. Gowland, and to the president for his conduct in the chair, proposed by Prof. Syed Ali Bilgrami and seconded by Mr. F. Samuelson.

In the evening Mr. Carnegie presided at the annual dinner, which was attended by about six hundred members. The Prime Minister congratulated the Institute on its international and scientific character, and speeches were made by the Duke of Devonshire, Sir H. Campbell-Bannerman, Mr. John Morley, Viscount Ridley, Sir Henry Fowler, Sir James Kitson, and Sir Samuel Chisholm.

## *UNIVERSITY AND EDUCATIONAL INTELLIGENCE.*

Oxford.—The 248th meeting of the Junior Scientific Club was held on Friday, May 8. Mr. R. T. Günther read a paper on "Changes of Land Level," in which he gave an account of researches he had carried out on this subject in the neighbourhood of Naples. The paper was illustrated by slides showing photographs of the coast in this district. Mr. N. V. Sidgwick, Lincoln, read a paper on "The Emission of Heat by Radium Salts."

Cambridge.—The council of the Senate propose that the Hartley University College, Southampton, should be adopted as an institution affiliated to the University of Cambridge.

The syndicate on the Mathematical Pass Examinations have issued an important report (*University Reporter*, May 12, 1903), in which they recommend a number of far-reaching changes in respect to the geometry, arithmetic, and algebra required in the previous examination. They "are of opinion that it is no longer desirable to insist on the maintenance of Euclid's Elements as a text-book."

The Board of Agricultural Studies report that during the past year 169 students have received instruction in agricultural science in connection with the department. The income of the department, about 3700*l.*, is practically balanced by the expenditure. The need of a permanent building to accommodate the various branches of the work is becoming apparent, and the Board are considering how the need can be supplied.

Dr. Ruhemann, university lecturer in organic chemistry, has been appointed the university delegate to the Congress of Applied Chemistry to be held next month in Berlin.

A bust of the late Dr. John Hopkinson was unveiled at the engineering laboratory on Monday. The vice-chancellor presided, and the speakers included Sir Joseph Lawrence, M.P., Lord Kelvin, Prof. Ewing, and Principal Hopkinson.

Dr. Charles Chilton has been offered and has accepted the professorship of biology at Canterbury College, Christchurch, New Zealand, in succession to Prof. Dendy.

The *Pioneer Mail* states that the site assigned to British India by the Mysore Government for the Indian University of Research to be created in consequence of Mr. J. N. Tata's munificent offer of an endowment measures about 370 acres, is situated in the north-west of Bangalore Cantonment, about four miles beyond the municipal boundary. Besides this gift the Mysore Government have offered five lakhs for initial expenses, and they hold out hopes of further assistance. Prof. Masson and Colonel Clibborn calculate the annual expenditure at 10,000*l.* sterling.

Bootham School, at York, was one of the few schools which received medals at the Nature-Study Exhibition last year for their exhibits showing the extent and nature of the work in nature-study done by the pupils. The sixty-ninth annual report of the Natural History Society of this school serves to explain the success then achieved. The study of natural objects is continued throughout the year, and is carefully arranged by the science masters so as to avoid waste of time and effort. A boy with a love for any branch of natural history receives every encouragement, and there can be little doubt of the good effect this sympathetic treatment has on the education imparted.

The fiftieth report of the Charity Commissioners for England and Wales shows that in the three years ending December 31, 1901, the total amount of charitable bequests in England and Wales reached 6,542,110*l.*, of which 279,890*l.* was intended for education. It has often been pointed out in these columns what large sums are given to higher education in the United States. During the three years dealt with by the Charity Commissioners in their report, benefactions for higher education alone to the extent of 10,392,000*l.* were reported in the United States. That is to say, for every pound sterling given during 1899–1901 for education in all its grades in England and Wales, more than thirty-seven pounds were given by American benefactors for university education alone. The sums devoted by private persons to higher education in the United States were nearly twice as great during these three years as those for every form of charity in England and Wales.

Numerous changes in the regulations for examinations at the University of Oxford have recently been announced. Among the alterations are those in mathematics for the first public examination (pass), in connection with which it is stated that any method of proof will be accepted which shows clearness and accuracy in geometrical reasoning, and that in the case of propositions 1–7, 9, 10 of Book ii., algebraical proofs may be used. The Board of the Faculty of Natural Science has also made similar changes in the mathematical requirements of the Final Pass School, Group C. (1). These changes come into force at the examinations of Michaelmas term, 1904. There are additions to the schedule of mechanics and physics for the preliminary examination of the Honour School of Natural Science, which come into force on and after Trinity term, 1905. The practical examinations, especially in physics, are to be more extensive than hitherto.

A copy of the report and handbook for the session 1902 of the Technical Instruction Committee of the Essex County Council has been received. It contains detailed information of every department of the work of the committee, and provides another example of the thorough manner in which the county councils have performed the educational duties entrusted to them by the Technical Instruction Acts, now repealed. In connection with the agricultural instruction in Essex, field meetings were held at seven centres. The objects of some of the meetings were to demonstrate the destruction of charlock in field crops by spraying with solutions of copper sulphate and nitrate of soda; the improvement of derelict grass land by manures; no verbal description could adequately convey an idea of the improvement effected by basic slag, which was one of the manures used, on either of these fields, and the farmers attending were strongly impressed by the almost miraculous effect of this manure both on the quality and quantity of the herbage.

The annual exhibition of the work of pupils in the day, evening continuation, truant, blind, deaf, and special instruction schools of the London School Board was opened last Saturday by Lord Reay at the Examination Hall, Thames Embankment. The exhibits were very numerous and thoroughly representative of the work of children of

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all ages, from the lowest classes of infant schools to the evening classes for youths. Though considerations of space only permit particular reference to the section including the science exhibits from the schools of the Board, it may be said that the work shown from the manual training schools, the classes in domestic subjects, the institutions concerned with the physically and mentally defective, and from the classes in art subjects was highly creditable, and served admirably to show the extent and excellence of the work being done in the public elementary schools of the metropolis. The collection of pieces of apparatus to assist the teaching of science was this year much smaller than on previous occasions, the reason being that the offer of prizes for the most successful work was this year discontinued. It was satisfactory to notice that the plan recommended more than once in these columns was on this occasion carried out for the first time, and added much to the convenience of the visitor—we refer to the separation of the work of teachers and that of pupils. Judging from the exhibits, more attention appears to have been given during the past year to work with squared paper and to nature-study subjects, and there were some excellent relief maps made by boys of thirteen which would have been a credit to much older students. Altogether there is good reason to believe that the science work being done in the schools of the London Board, under the direction of Dr. Stewart and Messrs. Hubble and Todd, will lead to the development of habits of careful reasoning and alert observation.

## SCIENTIFIC SERIAL.

*American Journal of Science*, April.—On the gaseous composition of the H and K lines of the spectrum, together with a discussion of reversed gaseous lines, by John Trowbridge. The continuous spectra observed in Geissler tubes when submitted to powerful disruptive sparks are not due to incandescence of the glass walls. The lines obtained coinciding closely with calcium lines, wave-lengths 3968 and 3933 are not due to calcium, but are true gaseous lines. The conclusion is drawn that the method of sifting out air lines from metallic spectra by observing the lines which are apparently common to these spectra and setting down such lines as air lines is a fallacious method.—The Boys radiomicrometer, by C. C. Hutchins. The simplicity and sensitiveness of this instrument indicate its employment in several lines of work, but the difficulty of preparing the small circuit which forms its fundamental part is very great. Details are given of the methods suggested by the author of overcoming these difficulties.—Meteoric iron from N'Goureyma, near Djenne, Province of Macina, Soudan, by E. Cohen. This meteorite belongs to the comparatively rare group of coarsely granular irons, and presents peculiarities of structure which appear to be unique. More than 97 per cent. of it consists of nickeliferous iron, the remaining constituents being schreibserite, troilite, daubreelite, lawrencite, and chromite.—Notes on the collection of Triassic fishes at Yale, by G. F. Eaton.—The mechanics of igneous intrusion, by R. A. Daly. A comparison of the hypothesis of overhead stoping in the formation of magma chambers with the laccolithic theory of crustal displacement, and with the theory of marginal assimilation of invaded formations.—*Brachiosaurus altithorax*, the largest known Dinosaur, by E. S. Riggs.—Some new structural characters of Palæozoic cockroaches, by E. H. Sellards.—The Bath furnace meteorite, by H. A. Ward. This meteorite fell on November 15, 1902, the date on which the orbit of the Leonids cuts that of the earth. The stone consists essentially of olivene and pyroxene, with troilite and metallic sprinklings. There is also present in small quantities a completely colourless, almost isotropic mineral, which is probably maskelynite.—The use of a rotating kathode in the electrolytic determination of the metals, by F. A. Gooch and H. E. Medway. An ordinary platinum crucible, rotated by a small electric motor at a speed of 600 to 800 revolutions per minute, is used as the kathode. Details of experiments with copper, nickel and silver are given, from which it would appear that much higher current densities may be employed than with the usual apparatus without any appreciable loss of accuracy.

## SOCIETIES AND ACADEMIES.

### LONDON.

**Chemical Society**, April 22.—Prof. W. A. Tilden, F.R.S., president, in the chair.—The following papers were read:—The velocity and mechanism of the reaction between potassium ferricyanide and potassium iodide in neutral aqueous solution, by F. G. **Donnan** and R. **le Rossignol.** The velocity of this reaction can be investigated by titration of the iodine liberated; the simplest interpretation shows that it is quinquemolecular.—A microscopic method of comparing molecular weights, by G. **Barger.** Small quantities of the two solutions are introduced into a capillary tube, where they form bi-concave, discoid drops, care being taken to use the solutions alternately, so that each drop of one solution is enclosed between two drops of the other. The capillary tube is then sealed at both ends, and the length of each drop is measured microscopically from day to day until no change in volume is apparent. At this point the solutions are equimolecular.—Note on the spectrum of pilocarpine nitrate, by W. N. **Hartley.** The author states that the curve recently described by Dobbie as that of the ultra-violet absorption spectrum of pilocarpine nitrate is that of nitric acid slightly modified by the alkaloid present.—Isomeric change of dipropionanilide into propionyl-*p*-aminopropiophenone, by Dr. F. D. **Chattaway.** Under the influence of various catalytic reagents, *e.g.* zinc and hydrogen chlorides, dipropionanilide, like diacetanilide and dibenzanilide, undergoes transformation into propionyl-*p*-aminopropiophenone; the latter and some of its derivatives are described.—Note on the formation of di- and hexa-methylammonio-cadmium chlorides, by W. R. **Lang.** Dry methylamine and cadmium chloride react at −11° to form a white powder of the composition $CdCl_2,6CH_3.NH_2$. This, when heated to 100°, furnishes a stable substance of the composition $CdCl_2,2CH_3.NH_2$.

**Royal Astronomical Society**, May 8.—Prof. H. H. Turner, president, in the chair.—The president announced that the council had elected Lady Huggins and Miss Agnes M. Clerke honorary members of the Society.—The secretary read a paper by the Rev. S. J. **Johnson** on a possible cause of the moon's obscurity on April 11, in which the author suggested that the presence of volcanic dust in the earth's atmosphere was the cause of the darkness of the moon's disc during the recent partial eclipse.—Mr. **Lewis** gave an account of a series of measures of double stars made with the 28-inch refractor at the Royal Observatory, Greenwich, during 1902, and described the orbits of some stars of especial interest.—Mr. Bryan **Cookson** gave a short account of his work on the satellites of Jupiter during a recent stay of two years at the Royal Observatory, Cape of Good Hope.—The Astronomer Royal exhibited and explained a series of diagrams of sun-spots and magnetic disturbance observed at the Royal Observatory during the years 1874 to 1901.—Dr. **Rambaut** read a paper on occultations of stars observed at the Radcliffe Observatory, Oxford, during the lunar eclipse, as well as observations of the colour of the shadow, penumbra, &c.—The president suggested certain subjects for discussion, and a short discussion took place on Mr. Percival Lowell's recent proposal of a standard scale of "seeing."—Mr. A. R. Hinks read extracts from a letter from Mr. **Ritchey,** of the Yerkes Observatory, in which he described his methods of developing photographs of nebulæ, &c. Mr. Ritchey stated that with regard to such nebulæ as those of Andromeda or Orion he made his prints from a negative in which the central portions had been reduced. He considered that the star images are smaller on a negative that had been developed extremely slowly.

**Anthropological Institute**, April 28.—Mr. H. **Balfour,** the president, exhibited specimens of the tools used by the natives of North-West Australia in the manufacture of glass spearheads. The tools consist of a piece of a sheep's leg-bone and of a water-worn pebble of a purely natural shape. The pebble was used in the earlier stages of the spearhead's manufacture, while the bone was used in its final shaping. Mr. Balfour also exhibited a spearhead which had been made with these tools. A full account of the exhibit, illustrated with a plate, will be found in the May number of

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